[06-03-01-T11]

Misc discrete

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[1] Prove: $2 \cdot 6 \cdot 10 \cdot 14 \cdot \ldots \cdot (4n-2) = \frac{(2n)!}{n!}$

[2] Prove: $\binom{n+2}{3} - \binom{n}{3}$ is a perfect square, i.e. equals $p^2,\ p \in \mathbb{Z}$.

[3.1] Prove: $\sum_{k=1}^{n+1} x^k y^{(n+1)-k} = x^{n+1} y^0 + \sum_{k=1}^{n} x^k y^{(n+1)-k}$

[3.2] Prove: $\sum_{k=0}^{n} x^k y^{(n+1)-k} = x^0 y^{n+1} + \sum_{k=1}^{n} x^k y^{(n+1)-k}$